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**Must-Knows: Unit 1 (Microevolution)**

Ms. OK, AP Biology, 2014-2015

**Test Format:** 18 multiple choice questions, 3 calculations questions (Hardy Weinberg Equilibrium), 1 short answer question

**Topic #1: Evolution Basics**

1. Centuries ago, the human appendix may have been used to digest raw meat that had not been cleaned properly. Now, the human appendix has lost its ability to function. Explain why this has occurred, using the term “natural selection” in your response.

2. Lynx (i.e. large cats) have evolved strong sprinting muscles to catch hares (i.e. rabbits). How might the hares evolve in response to this change in the lynx?

3. Suppose there was a fossilized canine species that possessed traits of ancient wolves and modern domestic dogs. What would this fossil be called, and how does it provide evidence for evolution?

4. Why do scientists look at DNA or amino acid (i.e. the building blocks of proteins) sequences when investigating the evolutionary history of several species?

5. Suppose a population of daisies ranges in height from short to tall. Over time, the environment becomes much windier and the tall flowers blow over and die. How will the population evolve over the next few generations? Use the terms natural selection, fitness, survival, and reproduction in your response.

**Topic #2: Types of Natural Selection**

6. Let’s say a population of elephants has trunks ranging in length from short to medium-length to long. Describe a change in the environment that may result in disruptive selection, and describe the changes that would occur in the trunk length frequencies in the population over time.

7. Let’s say a population of elephants has trunks ranging in length from short to medium-length to long. Describe a change in the environment that may result in stabilizing selection, and describe the changes that would occur in the trunk length frequencies in the population over time.

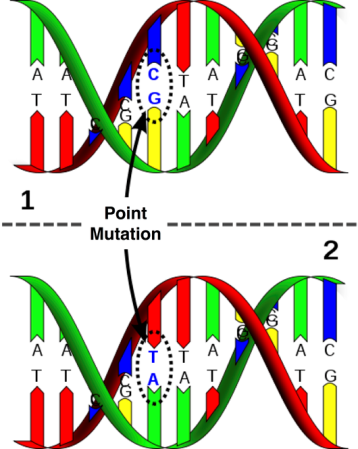
8. Let’s say a population of elephants has trunks ranging in length from short to medium-length to long. Describe a change in the environment that may result in directional selection, and describe the changes that would occur in the trunk length frequencies in the population over time.

9. Explain how sexual dimorphism is caused by sexual selection. Provide an example in a population of animals. (Note: Your example can be imaginary or real!)

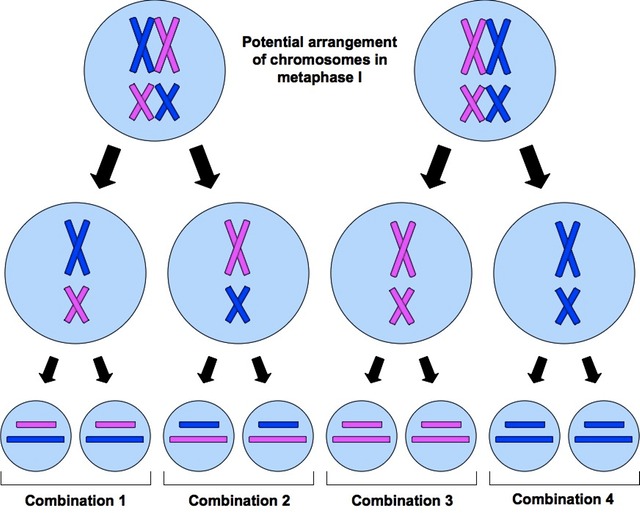
10. Male elk use their antlers to spar with one another in order to compete for females. Over time, the average male elk antler length has increased. However, at a certain length, long antlers make elk more likely to be caught and killed by wolves. Explain how sexual selection and natural selection have balanced one another in the evolution of elk antler length.

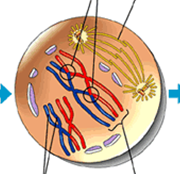
**Topic #3: Genetic Variation as Fuel for Natural Selection**

11. Why is sexual reproduction more beneficial than asexual reproduction when it comes to genetic variation and ensuring the survival of a species? Remember, sexual reproduction involves two parents and results in offspring that are not identical to one another or the parents. Asexual reproduction involves one parent and results in offspring that are identical to one another and the parent.

12. What process is shown in the picture to the right? When does this occur, and does it increase or decrease genetic variation in a population?

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14. What process is shown in the picture to the right? When does this occur, and does it increase or decrease genetic variation in a population?

15. What happens during fertilization? Why do we consider fertilization to be “random” in humans? What does the term “random” indicate? Does this process increase or decrease genetic variation in humans?

**Topic #4: Hardy Weinberg Equilibrium**

16. List and describe each of the five conditions that a population must meet to be in Hardy-Weinberg Equilibrium (i.e. a population that is not evolving with no changes in allele frequencies across generation). *Hint: These five conditions are the opposite of the five factors that can cause evolution.*

16. In Drosophila (fruit fly), the allele for normal wing length is dominant over the allele for short wings. In a population of 1000 individuals, 360 show the recessive phenotype. How many individuals would you expect to be homozygous dominant for the trait if the population is in Hardy Weinberg Equilibrium?

17. The allele for a widow's peak (hairline) is dominant over the allele for a straight hairline. In a population of 500 individuals, 9% show the recessive phenotype. How many individuals would you expect to be heterozygous for the trait if the population is in Hardy Weinberg Equilibrium?

18. The ability to taste PTC is due to a single dominate allele "T". You sampled 215 individuals in biology, and determined that 150 could detect the bitter taste of PTC and 65 could not. Determine the frequency of the dominant allele in this sample of students if the sample is in Hardy Weinberg Equilibrium?